reotactic technique and the judicious determination of the radiation dose are key factors in decreasing the complication rate.

Because radiosurgery is a new technology, it is still considered a secondary choice to the resection of lesions of the brain. But its proven effect, noninvasive nature, and cost-effectiveness—it is usually done on an outpatient basis—will make this technique more and more a part of the treatment of brain lesions.

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Ticlopidine Hydrochloride and Prevention of Stroke

TICLOPIDINE HYDROCHLORIDE is a novel platelet antiaggregant agent now available in the United States as an alternative to aspirin for the secondary prevention of stroke. Unlike aspirin, ticlopidine and other thienopyridine compounds have no effect on cyclooxygenase. Specific mechanisms of action remain under investigation, but likely involve the inhibition of adenosine diphosphate signal transduction at the platelet membrane. Ticlopidine provides greater efficacy than aspirin, but at the expense of more substantial adverse effects.

The Ticlopidine Aspirin Stroke Study directly compared these agents in subjects with recent transient ischemic stroke or mild ischemic stroke (cerebral or retinal) and found a 21% relative risk reduction in stroke (intention-to-treat analysis) with ticlopidine, 250 mg twice a day, versus aspirin, 650 mg twice a day. Benefits of ticlopidine use were shown in both sexes, with a three-year relative risk reduction in stroke of 27% for women and 19% for men. Notably, the advantage of ticlopidine use was greatest during the initial year: stroke recurrence was nearly halved compared with aspirin treatment.

Meta-analysis of all placebo-controlled aspirin trials before 1988 provides an estimated stroke risk reduction of 22% in subjects with a previous transient ischemic attack or minor stroke. These protective effects of aspirin can probably be generalized to women and to persons who have had a substantial stroke. The evidence for its efficacy in women is not extensive, however, and no large trials have evaluated the use of aspirin for preventing secondary stroke exclusively following a completed stroke. The Canadian American Ticlopidine Study, a placebo-controlled trial in subjects with recent thromboembolic stroke, showed a 33.5% stroke risk reduction during the first year in women and men receiving ticlopidine. Efficacy analysis also revealed a 30.2% risk reduction with ticlopidine use for combined stroke, myocardial infarct, and vascular death.

Most side effects of ticlopidine use—diarrhea, dyspepsia, rash—are minor, but lead to medication cessation in about one of five subjects. Serum cholesterol levels may increase slightly, but this occurs in patients with a reduced incidence of stroke, myocardial infarct, and vascular death. Although bleeding time is prolonged, serious hemorrhage is uncommon and gastrointestinal bleeding less common than with 1,300 mg per day of aspirin. The major adverse effect of ticlopidine use is a severe, reversible neutropenia (less than 450×10^3 neutrophils per liter) occurring in nearly 1% of patients, with onset virtually always during the first three months of therapy. Complete blood counts must be obtained every two weeks during the first three months of treatment. In the Ticlopidine Aspirin Stroke Study, the incidence of serious adverse effects did not differ between groups. Nevertheless, only reliable persons who understand the risks of ticlopidine should be considered treatment candidates.

The benefits of ticlopidine therapy are greatest for the first year after a transient ischemic attack or stroke, when the risk of recurrent stroke is highest. The use of ticlopidine should be considered on an individual basis in women and men at high risk for noncardioembolic ischemic stroke, especially those with a recent transient ischemic attack or completed stroke. In addition, ticlopidine use is indicated in persons who are intolerant to aspirin or who have recurrence of cerebral ischemia while on aspirin prophylaxis.

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Magnetic Resonance Spectroscopy

MAGNETIC RESONANCE SPECTROSCOPY (MRS), a noninvasive method to measure metabolites in brain tissues, has been used to study the abnormalities of stroke, multiple sclerosis, dementia, and encephalopathy.

The basis of nuclear magnetic resonance spectroscopy is that certain atomic nuclei have weak magnetic moments that align in the direction of a strong magnetic field. These nuclei can be manipulated in the magnet to yield information about their anatomical position or biochemical structure. Hydrogen protons in water have resonance properties that allow them to form images in magnetic resonance imaging (MRI). Hydrogen 1 and phosphorus 31 are the two major nuclei with magnetic